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ABSTRACT

A two-semester sequence of courses in French and Spanish for science and technology at Eastern Michigan University responds to alumni demands for better linguistic and cultural preparation for increasingly global business and industry. In addition, high schools teacher enrolled in the courses find they answer a need for professional upgrading of linguistic skills and cultural knowledge. The courses were created to complement an existing sequence in business French. Pedagogical goals include: (1) describing and explaining France's achieved status in high technology and her contribution to European and western economy; (2) increasing the breadth and depth of students' cultural knowledge through study of the international dimensions of French firms in the most successful scientific and technical fields; (3) developing technoscientific communicative skills in reading, writing, listening, and speaking; and (4) preparing students for the examinations leading to the Paris Chamber of Commerce and Industry certificate in scientific and technical French. The curriculum consists of six modules, each focusing on manufacture of specific products or provision of services in French multinational companies and their American subsidiaries. Topics include: transportation; food; glass; computers; energy; and chemicals. Cultural context is emphasized. (MSE)

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10 Technoscientific French for Teachers

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The implementation of a two-semester sequence of courses in French for Science and Technology at Eastern Michigan University has responded to alumni demands seeking better linguistic and cultural preparation for entry-level employment in increasingly global businesses and industries. Furthermore interviews with high school teachers enrolled in these courses, as well as information from a recent alumni survey, reveal that course goals and objectives also answer the need for professional upgrading of linguistic skills and cultural knowledge once a career is under way.

The courses in French for Science and Technology were created to complement the two-semester sequence in French for Business and Economy because, for several years, former students at the undergraduate or graduate levels, now employed in international business, have told us that although we have taught them French business practices and terminology as well as the socio-cultural background of the French economy, we have completely ignored their need to learn the general scientific and technical language of the multinationals. As an example, the *Detroit News Magazine* of September 2nd, 1985 relates a story of one of our International Trade Major and Exchange Program students who, upon arriving in Paris for her internship in a medium size enterprise dealing with coal and coal products, was faced with a marketing study of furnaces and burners imported from the United States. Under shock, she strongly reacted with, and I quote, "Hey! I am not supposed to know that stuff. I didn't learn anything like that in school!" and she ran to the U.S. Embassy for help. On the other hand, four graduate students who had taken the two courses in French for Science and Technology offered for the first time at Eastern Michigan University in 1984 felt immediately at ease when, on their internships at General Motors in Strasbourg, they had to deal with automobile parts in varied business situations such as inventories, purchasing and sales using computers and the "teletex" system. Similarly, another student now employed full-time in Paris by the largest

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European wholesaler of food products, Promodés, writes that she had just finished translating a telex from New York dealing with the shipment of IBM equipment.

As the above examples show, the creation of the courses in French for Science and Technology was prompted by students' need, but in addition by the requirements of the business community. Already, at the *Colloque de Français des Affaires* held at Eastern Michigan University in 1981, Executives of Ford Motor Company, General Motors, Renault/American Motors and Chausson Trading Company in Detroit specified that they required advanced linguistic and cultural skills from bilingual employees, and that an in-depth knowledge of technical vocabulary would be acquired on the job. Nonetheless, a general knowledge of the product and the manufacturing process is a desirable point of departure for the learning process. For these reasons, the courses in French for Science and Technology take a "cultural" approach, aimed at teaching a general knowledge of contemporary scientific and technical subjects. An alternative, "functional" approach would be to teach basic communicative skills to established professionals intending to work in a francophone country, e.g. "French for Mechanics" or French for Electrical Engineers". Few universities could, however, justify an upper-level course limited in scope to the functional aspects of a language. The courses' pedagogical goals are as follows:

1. To describe and explain in French, and with the help of audio-visual material and a broad documentation, France's achieved status in high technology and her contribution to European and Western economy.
2. To expand in breadth and in depth the cultural knowledge of students through a study of the international dimension of French firms in their most successful scientific and technical fields.
3. To develop the communicative skills of students of French in the technoscientific fields through reading, writing (compositions and translations), listening and speaking in order to insure that they will have acquired a linguistic competency matching their future employers' expectations.
4. To prepare students for the examinations leading to the *Certificate in Scientific and Technical French* of the Chamber of Commerce and Industry of Paris. Eastern Michigan University has been approved by the C.C.I.P as an examination center since 1984.

In order to expose students to a wide spectrum of high technological achievements, and to their influence on the French daily life, a large quantity of reading material is presented in a course-pack composed of excerpts from *L'Express*, *L'Expansion*, *Québec-Science*, *Europe*, *The Wall Street Journal*, *The Economist* from London, and most importantly from the *Annual Reports* from France's largest enterprises which can be obtained through a subscription to *L'Expansion*. In addition, the courses include an extensive audio-visual component of slides made from the above mentioned sources and videos provided by the French public and private enterprises. The pedagogical exploitation of slides and videos is fundamental and offers many possibilities which are too varied to be discussed in this paper.

The courses' program of study includes six teaching units or modules. Within each module, the manufacture of specific products, or the providing of services are studied along with the activities of typical French multinational companies and their subsidiaries in the United States as follows: First semester: A/ Transportation: The T.G.V. (High Speed Train), The Subway System (Matra), Aircrafts and Aerospace (Ariane and Airbus Industries), Automobiles (Renault, Peugeot, Robotics); B/ Food Industry: Generalities on Genetic Engineering, Fermentations, Wine Industry (Moet & Chandon in the U.S.), Milk and Milk Products (BSN-Gervais Danone, Yoplait), Nutrition and Buying Habits of the French; C/ Glass Industry: Manufacturing, Glass Fibers (St. Gobain), Thermal Insulation, Linear Optics (Essilor), Microscopes, Laser and Fiber optics. (Pilot programs in France).

Second semester: A/ Computers: Manufactured Goods (IBM France), CAD & CAM. Databank and Local Networks. Word Processors, Telex. Reproduction. B/ Energy: Coal Mining, Steel Industry, Petroleum, Natural Gas, Hydroelectric Power Plants, Nuclear Power Plants (the Atomic Energy Commission, Electricity of France, Elf-Aquitaine, Texas Gulf); C/ Chemical Industry: Petrochemistry and Plastics, Fertilizers, Resins and Paints, Tar and Asphalt (Group G.D.F. Chimie), Health, Agriculture, Textiles (Rhône-Poulenc in the U.S.), Perfumes, Cosmetics, Hygiene (Oréal in the U.S.), Gelatins (Rousselot in the U.S.), Pharmaceuticals and Veterinarian Products (Roussel UCLAF).

In order to illustrate briefly the linguistic and cultural content of the program of study of these courses, two modules will be briefly described as follows:

Food Industry: The application of micro-organisms' activities, the true base of biotechnologies, are found and explained in the manufacture of cheese, bread, wine and beer. Cheese manufacturing and the classification of cheese

is explained. This prompts a survey of the local supermarkets' cheese displays, and a comparative study of imported and domestic cheeses based on the norms established by the French milk industry. The manufacturing process of yoghurt, the marketing problems encountered for successful implantation of Danone and Yoplait in the United States, the discussion of the merits of the "yoghurt you eat" versus the "yoghurt you drink" make for classes where French becomes a tool for communication of information that pertains to everyday life. Moreover, diversification strategies of such large companies as BSN-Gervais Danone and Yoplait include the manufacturing and the retailing of frozen deserts, beer, bottled water, and of non-alcoholic beverages, all exported to the United States. The module on the "Food Industry" continues with a look at the "bubbly industry," which includes the Perrier Company, the origin of mineral water in general, its conditioning, bottling, packaging, and shipping, now with an added orange or lemon flavor, and in aluminum containers as requested by the airlines, but at a loss to the "Perrier" image. Another "bubbly" product of France is, of course, champagne.

The fermentation of grapes from *Pinot Noir*, *Pinot Meunier*, and *Chardonnay* vines, the maturation of the new wine in bottles for at least a year, the second fermentation due to the addition of sugar and yeast, the *remuage* of the bottles by *remueurs* now replaced by machines, are all part of the "Méthode Champenoise" discovered by Dom Perignon, a XVIIth century monk, and adopted later by French Champagne producers such as Moet-Hennessy and their subsidiaries Moet & Chandon in the Napa Valley in California. An excellent video describing the process in English is immediately reinforced with a twenty minute lecture in French. A bilingual vocabulary is handed-out for the understanding of the reading assignments, and the preparation for small group discussion scheduled for the next class meeting.

The module on the Automotive Industry is of Primordial interest to Michigan students, particularly since a minimum of 10 former students have held full-time jobs at Renault/AMC since 1980, and several have done an internship at La Régie Renault in Billancourt (Paris suburb), or at General Motors in Strasbourg. Graduates (B.A.'s & M.A.'s) have held entry jobs as bilingual and sometimes trilingual secretaries (French/Spanish/English), and most of them have been quickly promoted. Furthermore, one student became an engineer, studying at night at Wayne State University. Although after years of losses the nationalized Régie Renault sold its 46% stake in American Motors to Chrysler, most of our alumni remain employed in the new organization.

The introduction to the Automobile Industry module starts with the description of the basic crank-shaft system, the mechanical principle of the

steam engine which was later applied to the internal combustion engine. A slide presentation shows the main components of the automobile, and two videos explain assembly line activities, robots in action, and operations of the Peugeot proving ground. Once or twice per term, former students are invited to describe their specific jobs and activities to the class. For example, one person brought a huge chart to explain the different operations of a Canadian automotive assembly plant, while another lugged brazed aluminum radiators and cooling systems to the classroom in spite of a snowstorm. Finally, while the French automotive industry is not in prominence in the United States today, it is nevertheless important to mention that before World War II, the French car manufacturer Citroen's front wheel drive became famous, and that another French car manufacturer, Peugeot, built the first real aerodynamic car, the Peugeot 302, much too advanced for its time (1938), as was the Chrysler "Airflow" (1934). Today, the record fuel economy among four passenger cars, namely the Peugeot *ECO 2000* and the Renault *Vesta*, are in the forefront of global technology with a record of fuel consumption of 121 miles per gallon. Varied slides originating from the styling department of French companies illustrate this part of the module.

As stated in the course's goals and objectives, this two semester sequence prepares students to take the examinations leading to the Certificate of Scientific and Technical French offered by the Chamber of Commerce and Industry of Paris. It is well known that more than 100 universities in the United States now prepare students to take the C.C.I.P. examinations leading to the Certificate, and to the Advanced Diploma of Business French. The first center in the United States for these examinations was established at Eastern Michigan University in 1976. Since 1984, Eastern Michigan University is also the first Center to offer the C.C.I.P. Certificate in Scientific and Technical French. Twenty-five students now possess the Certificate. It should be mentioned that Professor Ketchum at the University of Colorado, and Professor Novack at Ursinus College in Pennsylvania, have also and simultaneously prepared and taught modules for the teaching of Scientific and Technical French within a cultural context.

The Certificate in Scientific and Technical French known as *Certificat pratique des professions scientifiques et techniques* offered by the Chamber of Commerce and Industry of Paris is based on proficiency in the following skills:

1. *Reading skills*. The candidates are to read a two-to-three page technical text and must answer twenty related questions in short paragraphs.

2. *Writing skills*. The candidates have the choice of two subjects for a short composition, i.e. a telex concerning a computer program, or a letter requesting technical information on a specific topic.
3. *Listening skills*. The examiner reads a text chosen by the Chamber of Commerce and Industry of Paris, or plays a corresponding audio-tape. Candidates answer a questionnaire based on the text.
4. *Oral skills*. The candidates read a scientific, or technical text aloud, and present a synthesis of the text to two members of jury who then question the candidate on the content and meaning of the text. The ungraded examination sheets, and the "Pass" or "Fail" grades are given to the candidates for the oral examination are then sent to Paris where the C.C.I.P. determines the eligibility of the candidates.

In my opinion, the level of difficulty of the examinations leading to the Certificate of Scientific and Technical French places it between the Certificate and the Advanced Diploma in Business French; I disagree, however, with the C.C.I.P., which places these examinations at a lower level then the Certificate of Business French. This can be explained because both the Certificate in Business French and the Certificate in Scientific and Technical French require at least 480 hours of study in the language to reach level 2 (advanced) of the ACTFL/ETS Proficiency Guidelines scale. Furthermore, the course taught at Eastern Michigan University is in essence "cultural" and requires a linguistic preparation reaching level 3 (superior) on the same scale in order to acquire an in-depth knowledge of the subject matter. In addition, I regret that these examinations do not require translating skills because practically all entry level positions in the automotive industry, for example, are for bilingual secretaries-translators who may be promoted within a short time if their language skills, work efficiency, and learning abilities are of high caliber. Furthermore, high school teachers enrolled in our classes in French for Science and Technology (graduate classes) find that translations (French/English and English/French) corrected in class, accompanied by the necessary grammatical explanations and followed by a class discussion on the best possible terminology and syntax, do indeed enhance reading, writing and oral skills in addition to vocabulary acquisition.

Several high school teachers, and among them some Eastern Michigan University alumni, have taken graduate classes in French for Business

and Economy, and French for Science and Technology to upgrade not only their language skills, but also their awareness of France's contemporary culture. A 1987 survey of our alumni has shown that these courses received a high rating. In addition, teachers currently enrolled in these classes have given me specific reasons for choosing these courses as follows, and I quote: "For my professional betterment"; "I am interested in cultural facts"; "To increase my students' interest in taking French"; "To open avenues for students in showing them that their knowledge of French can give them an edge when applying for a job"; "For the cultural side of the course"; "To complete my major in French"; "For a second career when I retire after 20 years of teaching"; "For a second career after my children are grown", and "Because *Je yeux être branchée*" – to be "plugged in" – a slang word with a technical connotation meaning to be up-to-date. Finally, a student said "Because I was a Marine, and I am interested in atomic energy." He was delighted to draw an atomic generator schematic on the board, and to show that he knew much more on the subject than I did. These teachers, one of them teaching at the junior high level, have also explained to me their attempts at incorporating our course material in their own classes. In spite of their busy schedules, some of them have devised ingenious ways to introduce science and technology to their students. For examples: presentation of the "word of the day" for a few minutes on the same subject for a week; presentation of the company of the day, the service of the day on the same weekly basis. In order to maintain a high level of interest in their classes, these teachers know that they must give students information that relates to subjects that are important to them possibly because of their own hobbies or the intensive high-tech input received through television. These teachers are in fact giving students an opportunity to draw a bridge or a link in their mind between the scientific and technical vocabulary in both languages, and to develop interests that may lead to further French studies within the context of future academic or professional training.

To summarize, the courses in French for Science and Technology, created to respond to suggestions of alumni from our program of Language and International Trade in accordance with employers' needs in the business and industrial sectors of the Detroit area, have attracted high school teachers as well. These teachers, as other graduate students, wanted not only to upgrade their linguistic skills, but also to be informed about French and European technological and economic culture. In this regard, it should be noticed that the courses in French for Science and Technology, offered at the graduate and undergraduate levels, are not limited to historical achievements, but include recent high-tech achievements of France such as the high

speed train (T.G.V.), the Ariane satellite system, or the Minitel system of telecommunications. These are only parts of larger modules and should maintain a high level of interest in advanced classes at the high school level.

In conclusion, we wish once more to make the distinction between the full but limited functional approach, and the broader cultural approach to the teaching of scientific and technical subjects in foreign language i.e., French. Language courses that fulfill the public's need in order to achieve well defined goals have been classified by French pedagogues as "functional" such as "French for Medical Secretaries", or "French for Architects", because they permit learners to practice immediately their profession in a francophone environment. On the other hand, the courses described in the foregoing are given in a "cultural" context. They are first offered to students who expect that the understanding of the subject matter will help them to reach a professional goal. But such courses require also from these students an advanced level of competency in French to assure that they can comprehend and communicate a vast domain of general knowledge and demanding intellectual content across the technoscientific spectrum, independently from their professional achievements.